

## Section 20

# FORESTS, FISHERIES, AND MINING

This section presents data on forests and forest reserves, commercial fishing and fish populations, and mining and mineral products.

The most recent available statistics show 1.7 million acres of forest and 700,000 acres of timberland in the State, most of it on the Big Island. Over 46,000 acres had been planted in eucalyptus and other species of trees by mid-1991. Recent surveys of vegetation on three islands show ohia lehua to be the most common type of tree on Oahu and Kauai (with acreages of 38,000 and 109,000, respectively) and kiawe the leading type (at 33,000 acres) on Molokai. Forest and brushland fires burned 60 square miles in fiscal 1991.

The commercial fish catch in fiscal year 1991 amounted to 22 million pounds, with a value of \$53 million to primary producers. Ahi (yellowfin and bigeye tuna) and aku (skipjack) accounted for 42 percent of the total value. Other important species are swordfish, marlin, spiny lobster, opakapaka, mahimahi, akule, and ono. Commercial fishermen numbered 4,043. Among Marine Life Conservation Districts, those with the most fish per acre were Honolulu Bay (5,676), Hanauma Bay (2,945), and Manele-Hulopoe Bay (2,757).

The value of mineral production reached \$100 million in 1991, almost all of it in cement (\$49 million) and crushed stone (\$48 million). The 1990 total, \$106 million, was an all-time high.

Important sources of data on these subjects are the United States Census of Mineral Industries and reports and records of the U.S. Bureau of Mines and Hawaii State Department of Land and Natural Resources, Aquatic Resources Division and Forestry and Wildlife Division. Historical Statistics of Hawaii, Section 14, summarizes the data for earlier periods. Comparable Mainland statistics are reported in the Statistical Abstract of the United States: 1992, Sections 24 and 25.

Table 583.-- FOREST AND NATURAL AREA ACREAGE: JUNE 30, 1991

Island	Conservation district forest land		Planted forest		Natural areas <u>3/</u>	
	Forest reserve land <u>1/</u>	Private forest land <u>2/</u>	Planted in preceding year	Total standing	Number of areas	Acres
State total ..	639,298	327,845	218	46,071	21	122,703
Hawaii .....	438,416	106,745	202	17,178	9	86,135
Maui .....	73,227	53,180	-	11,837	4	17,123
Kahoolawe .....	-	-	-	-	-	-
Lanai .....	-	6,150	-	512	-	-
Molokai .....	16,030	-	-	3,219	2	2,950
Oahu .....	28,626	87,920	13	7,097	3	1,770
Kauai .....	82,999	73,850	3	6,228	3	14,725
Niihau .....	-	-	-	-	-	-

1/ State owned and privately owned lands under surrender agreement in forest reserve system.

2/ Private forest land within conservation district. The majority of these lands were previously in the forest reserve system.

3/ Includes Waimanu Research Reserve (3,600 acres) and Alakai Wilderness Preserve (9,939 acres).

Source: Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife, records.

Table 584.-- WOODLAND ON FARMS, 1978 TO 1987, AND BY COUNTIES, 1987

[Acres]

Use	1978	1982	1987				
			State total	Hawaii	Maui	Hono-lulu	Kauai
Total ....	145,802	117,270	99,135	75,331	14,024	7,085	2,695
Pastured .....	40,242	36,550	27,517	22,973	992	2,797	755
Not pastured ..	105,560	80,720	71,618	52,358	13,032	4,288	1,940

Source: U.S. Bureau of the Census, 1987 Census of Agriculture, Hawaii AC87-A-11 (August 1989), pp. 15 and 36.

Table 585.-- LAND AREA, BY VEGETATION TYPE AND FOREST RESERVE STATUS, FOR MOLOKAI, OAHU, AND KAUAI: 1986

[In acres. Excludes land in forest plantations]

Vegetation type	Molokai		Oahu		Kauai	
	Total	Forest reserve	Total	Forest reserve	Total	Forest reserve
Total, all types	163,214	44,288	370,002	34,931	347,088	88,127
Tree type:						
Ohia lehua .....	32,833	30,161	37,563	9,524	109,040	50,702
Koa .....	-	-	28,548	6,601	13,438	6,223
Kukui .....	4,773	4,009	2,775	617	7,634	2,029
Kiawe .....	33,215	-	17,354	241	10,358	116
Eucalyptus .....	1,527	954	1,131	411	3,157	1,288
Guava .....	5,918	4,200	10,287	1,421	12,143	3,099
Other trees .....	2,673	573	36,700	6,776	32,763	6,043
Shrub type .....	16,417	1,527	33,974	2,965	36,061	7,189
Forb type .....	191	-	11,338	2,718	4,120	2,043
Grassland .....	38,751	764	45,102	3,261	34,168	5,198
Cultivated land .....	18,325	-	55,770	-	64,741	387
No vegetation .....	3,819	-	822	-	6,709	3,810
Urban and other .....	4,772	2,100	88,638	396	12,756	-

Source: Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife, multi-resource inventory reports.

Table 586.-- FOREST LAND, TIMBERLAND AREA, VOLUME OF SAWTIMBER,  
AND GROWING STOCK: JANUARY 1, 1987

Subject	1,000 acres	Subject	Amount
Total forest land .....	1,748	Sawtimber, net volume:	
Timberland .....	700	Total (mil. bd. ft.) .....	1,196
Federal .....	-	Softwood (mil. bd. ft.) .....	18
State or county .....	338	Growing stock, net volume:	
Private .....	362	Total (mil. cu. ft.) .....	280
		Softwood (mil. cu. ft.) .....	4

Source: U.S. Forest Service, cited in Statistical Abstract of the United States: 1990, p. 672.

Table 587.-- FOREST AND BRUSHLAND FIRES, 1989 TO 1991, AND BY  
COUNTIES, 1991

[Years ended June 30]

Subject	1989	1990	1991, by counties				
			State total	Hawaii	Maui	Hono- lulu	Kauai
Number of fires ..	82	210	205	94	50	55	6
Acres burned .....	6,585	3,384	38,352	21,258	14,347	2,733	14

Source: Hawaii State Department of Land and Natural Resources,  
Division of Forestry and Wildlife, records.

Table 588.-- COMMERCIAL FISHING: 1970 TO 1991

[Years ended June 30]

Year	Number of commercial fishermen	Commercial fish catch <sup>1/</sup>		
		Pounds landed	Pounds sold	Value to primary producers (dollars)
1970 ....	1,264	9,786,726	9,588,319	3,585,166
1971 ....	1,373	15,176,525	14,945,539	4,633,875
1972 ....	1,544	15,577,669	15,246,519	5,536,521
1973 ....	1,677	14,029,491	13,719,284	5,676,783
1974 ....	2,085	13,997,774	13,660,574	6,234,924
1975 ....	1,991	10,801,441	10,404,019	6,242,614
1976 ....	2,283	11,893,141	11,332,659	7,508,395
1977 ....	2,368	15,298,515	14,763,816	9,433,781
1978 ....	2,574	13,672,061	13,139,142	11,115,964
1979 ....	2,447	12,310,524	11,890,241	12,673,328
1980 ....	2,525	10,418,964	9,946,065	10,497,456
1981 ....	2,577	10,890,468	10,465,731	11,828,575
1982 ....	2,525	9,178,789	8,824,348	10,754,276
1983 ....	2,480	7,841,959	7,529,178	10,506,860
1984 ....	2,940	9,819,800	9,344,200	13,556,184
1985 ....	2,638	9,436,591	9,077,357	15,901,656
1986 ....	2,880	9,503,193	9,081,881	18,557,533
1987 ....	3,008	12,128,527	11,628,387	20,477,699
1988 ....	3,155	11,052,502	10,592,287	20,541,580
1989 ....	3,491	13,493,866	13,010,973	28,003,055
1990 ....	3,551	15,370,302	14,836,135	35,984,313
1991 ....	4,043	22,264,343	21,380,976	53,412,797

<sup>1/</sup> Represents the total catches of all licensed commercial fishers. Includes both sea and pond catches, but excludes coral harvests. Particularly for 1979-1988, data may be incomplete due to unreported aku (skipjack tuna) and longline boat catches.

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, Commercial Fish Landings for Fiscal Year (annual), as revised, and records.

Table 589.-- COMMERCIAL FISH CATCH, BY SPECIES: 1991

[Year ended June 30, 1991]

Species <u>1/</u>	Pounds caught	Pounds sold	Value (dollars)
Total catch .....	22,264,343	21,380,976	53,412,797
Sea catch, all species <u>2/</u> .....	22,241,647	21,358,520	53,360,933
Tunas .....	9,460,495	9,130,192	23,253,030
Aku (Skipjack) .....	1,667,798	1,566,664	2,187,081
Ahipalaha .....	450,485	443,807	644,934
Bigeye (ahi) .....	3,268,211	3,209,240	11,112,577
Yellowfin (ahi) .....	4,049,272	3,893,424	9,285,946
Billfishes .....	8,252,987	7,959,614	18,337,731
Blue marlin .....	1,227,965	1,141,432	936,890
Striped marlin .....	1,159,320	1,140,286	1,237,635
Swordfish .....	5,660,278	5,484,004	15,968,621
Miscellaneous pelagic species .	1,708,732	1,619,264	3,035,347
Mahimahi .....	1,003,934	955,589	1,757,048
Ono .....	400,001	361,652	884,763
Deep bottom fishes .....	818,956	768,546	2,687,026
Opakapaka .....	214,954	207,730	864,783
Uku .....	194,570	189,593	572,459
Ulaula .....	137,610	133,615	685,325
Akule/opelu .....	958,298	916,948	1,574,953
Akule .....	653,563	618,591	1,078,075
Opelu .....	304,735	298,357	496,878
Jacks .....	225,335	210,618	352,077
Inshore fishes .....	265,827	230,766	503,240
Sharks .....	146,111	133,826	101,090
Lobsters .....	219,221	215,808	2,883,028
Spiny lobster .....	173,395	172,429	2,432,145
Slipper lobster .....	45,826	43,379	450,883
Crabs .....	45,238	42,042	194,657
Shrimps .....	69,696	69,668	318,643
Shrimp laevigatus .....	69,602	69,574	318,168
Other animals .....	46,194	39,343	69,981
Seaweeds .....	9,752	8,018	34,167
Miscellaneous .....	14,805	13,867	15,963
Pond landings, all species .....	22,696	22,456	51,864

1/ Shown separately for all species over 250,000 lb. or \$250,000.

2/ Including species not shown separately.

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, Commercial Fish Landings, State of Hawaii--Fiscal Year 1990-1991.

Table 590.-- COMMERCIAL SEA LANDINGS, BY ISLANDS: 1991

[Year ended June 30, 1991]

Island	Pounds landed	Pounds sold	Value (dollars)
State total .....	22,241,647	21,358,520	53,360,933
Hawaii .....	2,808,944	2,677,643	4,739,968
Maui .....	664,697	537,777	1,212,777
Lanai .....	24,171	20,059	45,437
Molokai .....	55,937	44,489	132,624
Oahu .....	17,614,870	17,164,968	45,165,587
Kauai and Niihau .....	1,073,028	913,584	2,064,540

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, Commercial Fish Landings, State of Hawaii--Fiscal Year 1990-1991.

Table 591.-- COMMERCIAL SEA LANDINGS, BY FISHING METHOD: 1991

[Year ended June 30, 1991]

Fishing method	Pounds landed	Pounds sold	Value (dollars)
All methods .....	22,241,647	21,358,520	53,360,933
Aku pole and line .....	1,274,451	1,274,385	1,710,584
Longline .....	14,150,055	13,872,919	36,316,227
Handline .....	2,689,274	2,577,860	6,196,570
Trolling .....	2,936,552	2,516,372	4,439,943
Net .....	758,189	707,223	1,171,927
Trap .....	331,914	328,481	3,317,380
All other methods .....	101,212	81,280	208,302

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, Commercial Fish Landings, State of Hawaii--Fiscal Year 1990-1991.

Table 592.-- FISH POPULATIONS AROUND SELECTED SHORELINE AREAS:  
YEAR ENDED JUNE 30, 1992

Location	Species	Fish per acre	Pounds per acre
<b>Marine Life Conservation Districts:</b>			
Hanauma Bay, Oahu .....	100	2,945	685
Pupukea, Oahu .....	74	2,011	161
Molokini Shoal, Maui .....	97	2,219	388
Honolua Bay, Maui .....	70	5,676	1,285
Manele-Hulopoe Bays, Lanai .....	97	2,757	352
Wailea Bay, Hawaii .....	60	1,527	241
Lapakahi, Hawaii .....	38	1,552	281
Kealakekua Bay, Hawaii .....	62	2,710	287
Old Kona Airport, Hawaii .....	40	2,451	117
<b>Artificial reefs:</b>			
Maunaloa Bay, Oahu (tire modules) .	(NA)	(NA)	855
Waianae, Oahu (tire modules) .....	(NA)	(NA)	1,202
Keawakapu, Maui .....	(NA)	(NA)	595
<b>Fisheries Management Areas:</b>			
Red Hill, Hawaii .....	52	3,633	369
Honokohau, Hawaii .....	38	2,050	245
Keahu O Lu .....	60	4,434	354
<b>Other areas:</b>			
Kure Atoll, NWHI .....	95	5,006	922
Honaunau Bay, Hawaii .....	62	1,854	160
Kapalua Bay, Maui .....	73	3,786	880

NA Not available.  
Source follows next table.



Table 593.--MOST ABUNDANT AND HEAVIEST FISH SPECIES AT SPECIFIED  
LOCATIONS: YEAR ENDED JUNE 30, 1992

[Three leading species at each location, based on both individuals per acre  
and pounds per acre]

Location and species	Individuals per acre		Pounds per acre	
	Rank	Number	Rank	Number
Hanauma Bay MLCD, Oahu:				
Parrotfishes (scaridae) .....	1	294	9	16
Saddle-back wrasse (thalassoma duperrey) ...	2	270	10	15
Manini (acanthurus triostegus) .....	3	245	6	31
Pualu (acanthurus xanthopterus) .....	8	85	1	105
Redlip parrot (scarus rubroviolaceus) .....	(1/)	(NA)	2	74
Nenue (kyphosus bigibbus) .....	( <u>1</u> /)	(NA)	3	64
Pupukea MLCD, Oahu:				
Blackfin damsel (chromis vanderbilti) .....	1	399	( <u>1</u> /)	(NA)
Maiii (acanthuras nigrofuscus) .....	2	270	1	17
Saddle-back wrasse (thalassoma duperrey) ...	3	212	4	12
Maikoiko (acanthurus lecopareius) .....	10	54	2	17
Naenae (acanthurus olivaceus) .....	9	61	3	16
Kapalua, Maui:				
White weke (mulloides flavolineatus) .....	1	1,196	1	313
Saddle-back wrasse (thalassoma duperrey) ...	2	376	4	59
Parrotfishes (scaridae) .....	3	258	7	28
Clown tang (nasolituratus) .....	(1/)	(NA)	2	111
Naenae (acanthurus olivaceus) .....	( <u>1</u> /)	(NA)	3	79

NA Not available.

MLCD Marine Life Conservation District.

1/ Not in first 10.

Source: Hawaii State Department of Land and Natural Resources, Division  
of Aquatic Resources, Statewide Marine Research and Surveys, Survey of Fish  
and Habitat, July 1, 1991 to June 30, 1992.

Table 594.-- MINERAL INDUSTRIES: 1958 TO 1987

[Excluding mines at manufactures]

Subject	1958	1963	1967	1972	1977	1982	1987
Number of establishments <u>1/</u> .....	20	44	12	15	7	12	9
With 20 employees or more .....	8	4	3	5	2	4	4
All employees:							
Number (1,000) .....	.4	.3	.2	.3	.1	.2	.2
Payroll (million dollars) .....	1.7	1.7	1.6	2.4	1.9	3.8	7.4
Production, development, and ex- ploration workers:							
Number (1,000) .....	.4	.2	.2	.2	.1	.1	.2
Hours (millions) .....	.7	.6	.4	.4	.2	.2	.4
Wages (million dollars) .....	1.4	1.5	1.3	1.8	1.5	2.6	5.7
Value added by mining (million dollars) .....	4.6	4.9	5.0	9.0	8.1	9.7	23.5
Cost of supplies used, purchased machinery installed, etc. (million dollars) .....	2.0	2.1	2.3	4.1	2.9	5.9	10.4
Value of shipments and receipts (million dollars) .....	5.8	6.5	5.5	11.0	9.7	12.8	31.1
Capital expenditures (million dollars) .....	.7	.5	1.8	2.0	1.3	2.7	2.8

1/ After 1963, data for single-unit establishments without paid employees were excluded from the census of mineral industries. In 1987, seven of the nine establishments reported, including three of the four with 20 employees or more, were in SIC 142, crushed and broken stone, including riprap.

Source: U.S. Bureau of the Census, 1982 Census of Mineral Industries, Geographic Area Series, Pacific States, MIC82-A-9 (April 1985), tables 1 and 2a, and 1987 Census of Mineral Industries, Geographic Area Series, Pacific States, MIC87-A-9 (October 1990), Hawaii table 1.

Table 595.-- NONFUEL MINERAL PRODUCTION: 1989 TO 1991

[Production as measured by mine shipments, sales, or marketable production, including consumption by producers]

Minerals	1989	1990 <u>1/</u>	1991 <u>2/</u>
QUANTITY (1,000 SHORT TONS)			
Cement:			
Masonry .....	10	12	10
Portland .....	493	532	560
Gem stones .....	(NA)	(NA)	(NA)
Sand and gravel (construction) ....	*600	438	400
Stone (crushed) .....	6,205	*7,000	6,000
VALUE (\$1,000)			
Total .....	92,051	106,095	100,280
Cement:			
Masonry .....	1,566	1,870	1,600
Portland .....	40,495	46,311	48,720
Gem stones .....	44	55	60
Sand and gravel (construction) ....	*3,200	2,459	2,300
Stone (crushed) .....	46,746	*55,400	47,600

\* Estimated.

NA Not available.

1/ Revised.

2/ Preliminary.

Source: U.S. Bureau of Mines, "The Mineral Industry of Hawaii in 1991," Mineral Industry Surveys (1992).